

[002] This application is a National Stage completion of PCT/EP2003/008325
filed on July 28, 2003 which claims priority from German Patent Application
Serial No. 102 34 742.5 filed July 30, 2002.

[003] FIELD OF THE INVENTION

[005] BACKGROUND OF THE INVENTION

[008] SUMMARY OF THE INVENTION

[016] BRIEF DESCRIPTION OF THE DRAWINGS

[029] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

1-30. (CANCELED)

31. (NEW) A method for culturing cells (2) comprising the steps of;

introducing the cells (2) into a cell culture chamber which is formed in an interior of a support structure (1), the cells (2) forming a cell layer, the support structure (1) at least approximately corresponding in shape and in size to one of an implant and a prosthesis to be formed by the cells (2);

supplying at least one of nutrients and oxygen to the support structure (1);

and

externally furnishing the support structure (1) with a boundary layer (4) which is impermeable to cells.

32. (NEW) The method according to claim 31, further comprising the step of forming the support structure (1) from a porous material which is permeable to cells (2).

33. (NEW) The method according to claim 31, further comprising the step of forming the support structure (1) as a place holder material which is one of removable or convertible by the cells (2).

34. (NEW) The method according to claim 33, further comprising the step of forming the support structure (1) from phosphate.

35. (NEW) The method according to claim 32, further comprising the step of furnishing the support structure (1) with the cells and a nutrient solution at a start of culturing, after which the boundary layer (4) is applied.

36. (NEW) The method according to claim 31, further comprising the step of forming the boundary layer (4) from one of a biological material and a synthetic material.

37. (NEW) The method according to claim 36, further comprising the step of forming the boundary layer (4) from a hydrogel.

38. (NEW) The method according to claim 36, further comprising the step of forming the boundary layer (4) from an alginate which is polymerized in a calcium chloride solution and, after formation of the cell layer, removing the boundary layer (4) from the support structure (1) by a low-calcium solution.

39. (NEW) The method according to claim 36, further comprising the step of forming the boundary layer (4) by an overgrowth with cells which form a membrane.

40. (NEW) The method according to claim 39, further comprising the step of forming the boundary layer (4) by one of cartilage cells, fibroblasts, osteoblasts and chondrocytes.

41. (NEW) The method according to claim 31, further comprising the step of forming the boundary layer (4) so as to be gas permeable.

42. (NEW) The method according to claim 31, further comprising the step of applying the boundary layer (4) by one of spraying on a material which is impermeable to cells and dipping in a bath (3).

43. (NEW) The method according to claim 31, further comprising the step of introducing, between the support structure (1) and the boundary layer (4), an intermediate layer which does not bond to the support structure (1).

44. (NEW) The method according to claim 43, further comprising the step of introducing, as the intermediate layer, one of a lipid layer, glycoproteins, proteins, biodegradable or removable layers.

45. (NEW) The method according to claim 31, further comprising the step of using one of a liquid and a viscous polymer as the intermediate layer (4).

46. (NEW) The method according to claim 31, further comprising the step of furnishing the support structure (1) with at least one inlet (5, 6) for at least one of oxygen and nutrients.

47. (NEW) The method according to claim 31, further comprising the step of forming the boundary layer (4) so as to be mechanically removable.

48. (NEW) The method according to claim 31, further comprising the step of forming the boundary layer (4) so as to be one or more of detachable, soluble and is vascularized or prevascularized.

49. (NEW) The method according to claim 31, further comprising the step of introducing a plurality of the support structures (1) into a nutrient solution.

50. (NEW) The method according to claim 31, further comprising the step of exposing the support structure (1) to pressure by a liquid or gaseous medium.

51. (NEW) The method according to claim 50, further comprising the step of inserting at least one support structure (1) into a container (14) which is exposed to a changing gas or liquid pressure by a pressure medium (19).

52. (NEW) The method according to claim 50, further comprising the step of placing a protective film (20) around the support structure (1) which forms a pressure

chamber around the support structure (1), and the protective film (20) being exposed to pressure loads on a side facing away from the support structure (1).

53. (NEW) The method according to claim 31, further comprising the step of incorporating the support structure (1) into a nutrient circuit (11) and is bound to an oxygen carrier.

54. (NEW) The method according to claim 53, further comprising the step of providing a nutrient reservoir (13) in the circuit (11).

55. (NEW) An apparatus for carrying out a method for culturing cells (2) comprising the steps of;

introducing the cells (2) into a cell culture chamber which is formed in an interior of a support structure (1), the cells (2) forming a cell layer, the support structure (1) at least approximately corresponding in shape and size to an implant or a prosthesis, to be formed by the cells (2);

supplying at least one of nutrients and oxygen to the support structure (1);
and

externally furnishing the support structure (1) with a boundary layer (4) which is impermeable to cells,

the support structure (1) is furnished with feeds and outlets (5, 6) and is used in a container (14) which is furnished with feeds and outlets (15, 16).

56. (NEW) The apparatus according to claim 55, wherein the support structure (1) is inserted into a nutrient circuit (11).

57. (NEW) The apparatus according to claim 55, wherein the support structure (1) corresponds at least approximately in shape and in size to a vertebra.

58. (NEW) The apparatus according to claim 55, wherein the support structure (1) corresponds at least approximately in shape and in size to a bone part.

59. (NEW) The apparatus according to claim 55, wherein the container (14) is furnished with at least one pressure connection (17) for connection to a pressure source (19).

60. (NEW) A support structure for culturing cells (2) for formation of a cell layer in a cell culture chamber in an interior of the support structure (1), the support structure being formed from a porous material and furnished externally with a boundary layer (4) which is impermeable to cells.